US ERA ARCHIVE DOCUMENT

12/2/1993

DATA EVALUATION RECORD

- 1. CHEMICAL: Oxyfluorfen. Shaughnessey Number 111601.
- 2. TEST MATERIAL: RH-2915 Technical; lot # 2-3985: 72.5% active ingredient; a red-black solid.
- 3. <u>STUDY TYPE:</u> Avian Reproductive Study. Species Tested: Mallard (<u>Anas platyrhynchos</u>).
- 4. <u>CITATION:</u> Piccirillo, V.J. 1982. One generation reproduction study in the mallard duck with RH-2915 technical. Conducted by Borriston Laboratories, Inc., Temple Hills, Maryland. Project No. 1005 (formerly 202-X). Submitted by Rohm and Haas Company, Spring House, 71-4(b) Pennsylvania. MRID No. 4153012-05.
- 5. REVIEWED BY:

Jeffrey L. Lincer, Ph.D. President Eco-Analysts, Inc.

Signature:

Date:

6. APPROVED BY:

Michael L. Whitten, M.S. Wildlife Toxicologist KBN Engineering and Applied Sciences, Inc.

Henry T. Craven, M.S. Supervisor, EEB/HED USEPA

signature:

Date:

11/17/93

Signature:

Date:

4.62.93

7. CONCLUSIONS: The study appears to be scientifically sound but does not fulfill the requirements for an avian reproductive test. Based on the data presented, it appears that 100 ppm (nominal concentration) RH-2915 had no effects on the reproductive capabilities of the mallard duck. The study has been classified as Supplemnetal. Because only one treatment group was tested the study cannot be up-graded to "Core" (as per conversaation with D. Mclane).

8. RECOMMENDATIONS: See Section 14 D.

DATA EVALUATION RECORD

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Signature: Michael L. Walter
For J. L. Lincer

Date: 5/29/91

signature: Muhau d. Whit

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Signature: Hong T. Com

Date:

- 7. CONCLUSIONS: The study appears to be scientifically sound but does not fulfill the requirements for an avian reproductive test. Based on the data presented, it appears that 100 ppm (nominal concentration) RH-2915 had no effects on the reproductive capabilities of the mallard duck.

 (Supplemental)
- 8. RECOMMENDATIONS: See Section 14 D.
- 9. BACKGROUND:

10. DISCUSSION OF INDIVIDUAL TESTS: N/A.

11. MATERIALS AND METHODS:

- A. Test Animals: Sixty-four adult mallard ducks (Anas platyrhynchos), 16 males and 48 females, were selected for use in this study. These birds were selected from the flock maintained at Truslow Farms. The birds were six months of age upon arrival at the reproduction facility. All the birds were examined for physical defects and blood-tested for typhoid upon arrival. The birds were acclimated to the reproduction facility for 21 days prior to initiation of the study. While in quarantine both food (Agway Game Bird Breeder Ration) and water were provided ad libitum.
- Test System: During the study the birds were housed В. (one male and three females) in pens with straw-covered concrete floors measuring 14' x 4' x 7'. During the twenty-one week exposure period the temperature ranged from 33°F-64°F and humidity ranged from 33%-77%. light cycle was six hours of light and 18 hours of darkness per day. The frequency of bedding changes was reduced during the egg-laying cycle so that nesting would not be disrupted. On January 19, 1982, the light cycle was increased to 16 hours of light per day to induce egg laying. This light cycle was maintained throughout the remainder of the study. A light intensity of 6 foot candles at bird level was considered adequate by protocol. Light readings were taken at bird level near the feeder within each pen. At initiation, mean light intensity readings were 6.4 foot candles for the control group and 6.8 foot candles for the 100 ppm RH-2915 group. This light intensity induced early egg laying so the light intensity was reduced to 1-2 foot candles during Week 7 of the study.

Eggs were collected daily and stored at 65°F. At weekly intervals the eggs were removed from storage and placed in an incubator. During incubation the eggs were maintained at 99.9°F. On Day 0 of incubation the eggs were candled for eggshell cracks, on Day 14 for fertility and early death of embryos, and on Day 21 for embryo viability. On Day 23 the eggs were transferred to a hatcher. Turning frequency of eggs was six revolutions per day.

On Day 7 of Weeks 1, 3, 7 and 9 of the egg laying phase all eggs collected were measured for eggshell thickness by cracking open the egg at the girth, washing out the contents and allowing the shells to dry for 48 hours. The thickness of the dried shell plus the membrane was measured at four points around the girth using a micrometer calibrated to 0.01 mm. Egg shell thickness is the mean of the four point measurements. Egg contents were saved frozen and forwarded to the sponsor for analysis.

Hatchlings were housed in clean wire brooder batteries measuring 28" x 32" x 11". The hatchlings were identified by color coding on the breast for group number and by toe punching (web of foot) for pen numbers. The hatchlings were observed for mortality and toxic effects for 14 days after hatching. During this period the hatchlings were fed Agway Game Bird Starter Feed and water ad libitum. Temperature inside the testing facility ranged from 76°F-98°F and humidity ranged from 39%-65%. The light cycle was 17 hours of light and seven hours of darkness per day.

C. <u>Dosage:</u> Birds received a 100 ppm test dosage or a control diet <u>ad libitum</u> during the eleven week prelaying period and a ten-week laying cycle.

The test material, RH-2915 Technical (Lot 2-3985, TD 81-441), was used in the formulation of premixes which were prepared at Borriston Laboratories. Premixes were prepared every two weeks. The final diet preparation using the premixes was accomplished at Truslow Farms. The premixes were adjusted to a 100% active ingredient basis using a 72.5% active ingredient value supplied by the sponsor and were formulated as follows: appropriate amounts of RH-2915 were weighed and heated to better liquify for 2 to 3 minutes. Corn oil was added and the solution was stirred for two to three minutes on a Corning magnetic stirrer. This solution was then added to the appropriate amounts of basal diet to achieve the required parts per million (ppm) concentration of the premix, and blended for one hour in a Hobart C-100-T After mixing, the premix was divided into two 300 gram aliquots, sealed in Kapak bags, and stored frozen until shipment to Truslow Farms for the final Two separate premix packages were prepared in this manner so that one package would be used for Week

1 after mixing and the second package would be used for Week 2 after mixing. Thus, finished diets were prepared fresh weekly and the premix used may be two weeks old. The samples were submitted to the sponsor for analysis. The control diet was prepared in the same manner as the 100 ppm RH-2915 diet except that no RH-2915 was added. Appropriate amounts of basal diet were weighed and approximately three kilograms of this preweighed basal diet were mixed for one minute with the premix supplied by Borriston Laboratories. remaining amount of the preweighed basal diet was added and the feed was mixed for 20 minutes in a Dayton mixer. The premixes from Borriston were stored frozen at Truslow Farms until use.

Design: Upon arrival at the reproduction facility. the D. birds were randomly assigned to clean pens and identified with uniquely numbered leg bands. At the end of the 21-day quarantine period the mallards were assigned to the either a control or 100 ppm group.

Adult birds were observed twice daily for mortality, moribundity and toxic effects. Individual body weights were recorded at Week 0, Week 10, and Week 21 (termination). All parental birds were sacrificed, necropsied, and examined for gross pathological changes upon completion of the laying cycle. Eggs were collected daily and groups placed in an incubator at weekly intervals. Hatchlings were observed twice daily for mortality, moribundity, and toxic effect.

Statistics: Statistical methods were not provided. E.

REPORTED RESULTS: 12.

Parental Data

Mortality and Observations

One female in the 100 ppm group died during the study. death was considered incidental and not related to treatment. No other parental deaths occurred during this study. In addition, no signs of toxicity were observed in parental birds.

Body Weight

Tabular data provided the individual and mean parental body weights at Weeks 1, 10 and 21 (termination). No treatment related effects on body weight were observed. Body weights for male birds from both the control group and the treatment



group showed little or no change from initiation through termination of the study. Female control birds showed no appreciable change in body weight from initiation through Week 10 and a slight increase in body weight from Week 10 through termination. Body weights for female birds at 100 ppm showed increases in body weight from initiation through Week 10 and from week 10 through termination.

Food Consumption

Mean and total pen food consumption data were provided. Food consumption in the 100 ppm group was significantly lower than in the control group during weeks 3, 12, and 20. No other food consumption values were statistically different from the control. No food aversion or palatability problems were noted. A 30% drop in food consumption was seen in the control group from Week 3 to Week 4 which returned to normal on Week 5. The reason for this decrease is not known.

Egg and Offspring Data

Eggs Laid and Cracked

The mean number of eggs laid per pen was 171.4 and 167.4, respectively, for the control and RH-2915 group. The incidence of eggs cracked per eggs laid was also comparable; 0.73% and 1.12% for the control and RH-2915 groups, respectively.

Embryo Viability and Hatchling Survival

Comparison of data regarding embryo viability and hatchability showed no differences between the control and the treatment group. The data for both groups in this study were well within the normal historical control ranges for this species except for the 14-day Survivors/Eggs Hatched. The survivability of the hatchlings was exceptionally good in this study; 98.8% (Control) and 99.9% (100 ppm). The number of 14-day hatchlings per hen is 39.25 and 35.36 for the control and treatment group, respectively.

No distinct differences in mean body weights of the 14-day hatchlings were observed between the control and treated group (Table 5). In addition, no signs of treatment related toxicity were observed in the hatchlings.

Eqq Shell Thickness

No effect on egg shell thickness was observed when comparing the 100 ppm RH-2915 group to the control; 0.401 mm vs 0.401 mm, respectively.

Gross Pathology

Upon completion of the egg laying cycle, parental birds were necropsied and the following gross observations were noted:

- Group 1 (0 ppm) One bird with pale liver (#120 female)
 Light weight and early molt was noted in
 one bird (#102 female). Six birds not
 in production, otherwise normal.
- Group 2 (100 ppm) One bird with pale liver (#144 female)
 Six birds not in production, otherwise
 normal.

No treatment related findings were observed.

"Based on the results of this study, environmental levels of up to 100 ppm RH-2915 Technical are not considered to present a hazard to the reproductive capacity of the Mallard duck. No adverse findings were observed in parental birds and the reproductive parameters and indices were comparable between the treated group and the control group."

Regarding quality assurance measures, I.J. Morici indicated in a memo dated October 25, 1982 to Dr. T.D. Rogerson that the report had been reviewed by the Quality Assurance Unit and himself. In his judgement, the study "was scientifically sound and may be submitted to EPA for regulatory purposes." With the exception of proposed QA practices for sample collection (Appendix 3), no details were provided. No GLP statement was provided.

14. REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:

- A. <u>Test Procedure:</u> This test was carried out in 1982, prior to the publication of both the current Subdivision E Guidelines and the relevant SEP. For the record, however, the following is noted:
 - (1) Only two test groups were used; one control and one treatment group (vs. a minimum of three groups, SEP pg. 3). This was, however, a repeat study which may account for the deviation.
 - (2) One male and three females per pen were used (vs. two males and five females per pen, SEP pg 3). Apparently, this issue has already been the subject of some correspondence between the

applicant and the EPA (see October 26, 1982 letter from Morici to Rogerson). The applicant contends that the protocols for the repeat studies were sent to the EPA for approval prior to the study initiation. The reviewer is not in a position to comment further on this issue.

- (3) The temperature ranged from 33°F-64°F and the humidity from 33%-77% (vs. 70°F and 55%, respectively, SEP pg.3).
- (4) Body weights were taken at weeks 1, 10, and 21 (termination) vs. biweekly up to eight weeks or to the onset of egg laying (SEP pg.4).
- (5) Corn oil was used as a vehicle but the relative amount of this substance was not verifiable (vs. the recommended amount of one or two percent, SEP pg.4).
- (6) Collected eggs were stored at 65°F (vs 61°F, SEP pg.5).
- (7) No statistical methods were provided (SEP pg.8).
- (8) No table of diet composition was provided; therefore, it could not be reviewed (SEP pg.10).
- B. <u>Statistical Analysis</u>: The registrant should ensure that future reports contain details on statistical methodology. Statistical analyses of reproductive parameters were performed by the reviewer (attached) using a computer program based on the EEB Bigbird program.

The results of these analyses generally matched those reported by the authors. The reviewer's analyses resulted in the following significant differences between the control and treatment group: (1) The ratio of 14-day old survivors/eggs hatched was higher in the treatment group than in the control; (2) the weight of 14-day old chicks was lower in the treatment group than in the control group during week 1, and higher in the treatment group than in the control group during weeks 4 and 5; (3) Food consumption was lower in the treatment group than in the control group during weeks 12 and 20 (the author reported significant differences



during weeks 3, 12, and 20).

c. <u>Discussion/Results:</u> The significant differences chront between treatment and control groups mentioned above conclude are not considered to be treatment-related.

Although a number of deviations from what is now required by the guidelines and the SEP were noted, most do not indicate fatal flaws in the methodology. One issue does, however, stand out: the use of only two (vs. at least three) test groups. Since this study was a requested repeat study, an examination of historical documentation will be necessary to determine if EPA authorized this.

Based on that data presented, it appears that 100 ppm RH-2915 Technical does not present a hazard to the reproductive capability of the mallard duck. The study is scientifically sound but does not fulfill the requirements for an avian reproductive test, since only one treatment group was tested.

D. Adequacy of the Study:

- (1) Classification: Supplemental.
- (2) Rationale: The study was conducted using only one treatment group and as such fails to satisfy the data requirement in that a no-effect level was determined.
- (3) Repairability: N/A
- 15. COMPLETION OF ONE-LINER: Yes; May 5, 1991.

ONE LINER SHEET

Validation	210			Lincer/ Suppl. 5-5-91				
of Reviewer/	nare			<u>Lincer/</u> 5-5-91				
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Chemical Class		Effected/Parameters	none	none				
ue	Results	Dose (ppm)	0	100			: a	
Name Oxyfluorfen		Group	Control	Treatment	Treatment II	Treatment III	Study Duration:	Comments:
1 Chemical Chemical	* Active	·	platy rhynchos	72.5				
Shaughnessey No. 111601 Chemical Name Study/Species/Lab Chemical	Succession	Avian Reproduction,	Species: Mallard (Ands platy rhynches) Control		Lab: Borriston	•	Acc: 4153012-05	

	Dependent Weight:	
	Dependent Variable: RESPONSE weight:	
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89.21180639 B -4.53464430 B 0.00000000 B	Estimate	9134.07261154	Type III SS	9134.07261154	Type I SS	34.43544	C.V.	21.639.15743264	12505.08482110	9134.07261154	Sum of Squares	
86.10 -3.20	T for HO: Parameter=O	9134.07261154	Mean Square	9134.07261154	Mean Square	29.88679214	Root MSE		893.22034436	9134.07261154	Mean Square	
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1.41804594	Std Error of Estimate	0,0064			Pr > F	10,48,047	RESTUNCE Mean			C . C C C C .	2 22	ο: •

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are blased, and are not unique estimators of the parameters. 100 ppm Estimates

analysis of nh/el data

General Linear Models Procedure

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	INTERCEPT TRT CONTROL 100 ppm	Farameter	TRT	Source	TRY 1	Source	0.145054	R-Square	Corrected Total 15	Error 14	Model 1	Source	Weight: WT
•	52.12725981 B 4.53269272 B 0.00000000 B	Estimate	13917.50215625	Type III SS	13917.50215625	Type I SS	140.6564	C.V.	95947.01069005	82029.50853379	13917.50215625	Sum of Squares	
The second second to	1.54	T for HÖ: Parameter=0	13917,50215625	Mean Square	13917.50215625	Mean Square	76,54574194	Root MSE		5857.25060956	13917,50215625	Mean Square	
the normal equations.	0.0001	Pr > 1T)	2,38	F Value	2,38	F Value					N. 38	F Value	
equations. Estimates	0,09185101 0,94101112	Std Error of Estimate	0,1456) } }	0.1456	P1 > F	54.42036746	RESPONSE Mean			0.1456	T 7 7	•

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters.

analysis of nh/le data

General Linear Models Frocedure

INTERCEPT TRT CONTROL 100 PPm	Parameter	TRT	Source	TRT	Source			Corrected Total	Error	Model	Source	Dependent Variable: RESPONSE Weight: WT
<i>-</i> ,		<u>p</u> .	DF	.د.	Ħ	0.072367	R-Square	<u>.</u> .	4.4	بحو	DF.	e: RESPONSE
63.02275903 B 4.26444211 B 0.00000000 B	Estimate	9977.33990751	Type III SS	9977.33990751	Type I SS	146,5350	C.V.	137871.22822807	127893.88832057	9977.33990751	Sum of Squares	
21.49	T for MO: Parameter=0	9977.33990751	Mean Square	75.206622.1266	Mean Square	95,57864687	Root MSE		9135.27773718	. 9977,33990751	Mean Square	
0.0001	Pr > (T)	1.09	η.	1.09	TI		•••			1.09	F Value	
2.93290921 4.08052194	Std Error of Estimate	0.3137	**************************************	0.3137	0r > 1	65.22582767	RESPONSE Mean			0.3137	मि १ भ	

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INTERCEPT CONTROL 100 ppm	Parameter.	TRT	Source	TRT	Source	0.001823	R-Square	ted Total	in and a second	Model	Source	Dependent Variable: RESFONSE Weight:
		**	DF.	منو	DF	323	17.49	10	14	, 24	DF	ONSE
84.03757093 B -0.31252915 B 0.00000000 B	Estimate	54,41960872	Type III SS	54.41960872	Type I SS	55.00591	C.V.	29854.96064286	29800.54103414	54,41960872	Sum of Squares	
-0.16	T for HO: Parameter≖O	όι	%	ជ	**************************************	4			2128	OI A	3.	
3.0	Pr > [T]	54,41960872	Mean Square	54.41960872	Mean Square	46.13686242	Root MSE		2128.61007387	54.41960872	Mean Square	
0.0001	171	0.03	F Value	0.03	F Value					0.03	F Value	
1.40400042	Std Error of Estimate	0.8752	₽ ↑ >	0.8752	Pr > =	83.87619326	RESPONSE Mean			0.8752	101 > 1	

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General Linear Models Frocedure

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· · · · · · · · · · · · · · · · · · ·	P	DF	Dependent Variable: RESPONSE Weight: WT
	5913.66139214	Sum of Squares	
	5913.66139214	Mean Square	
	0.71	F Value	•
	0.356	Pr >	

INTERCEPT CONTROL 100 ppm	Parameter	TRT	Source	TR7	Source		7.	Corrected Total	ETTOT	Mode L	Source	
		μ.	DF	Į.s.	DF	0.061099	N-Square	15	14	Þ	p	
70.30967220 B 3.07936336 B 0.00000000 B	Estimate	5913.66139214	Type III SS	5913.66139214	Type I SS	112,1017	C.V.	96788.67389053	90875.01249839	5913,66139214	Sum of Squares	
30.62	T for HO: Parameter=0	5913,66139214	Mean Square	5913.66139214	Mean Square	80.56719135	Root MSE		6491.07232131	5913.66139214	Mean Square	
0.3560	Pr > 1Tj	0,91	F Value	0.91	FValue				7 (1) (1) (2) (1) (2) (1) (2) (2) (3)	0.91	F Value	
2,29630302 3,22619739	Std Error of Estimate	0.3540) Pr ~	0,3540	Pr > F	71.86971841	RESPONSE Mean			0.3560	PY > F	

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General Linear Models Procedure

Source	Dependent Variable: RESPONSE Weight: WT
DF	able: RESPONSE WT
Sum of Squares	
Mean Square	
F Value	

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rameter	TRT	Source	TRT	Source			Corrected Total	Error	Model	Source	me ignt:
	. نيو	DF.	مدر	DF	0.012165	R-Square	<u> </u>	<u>1</u> .		DF.	8
Estimate	51.11135307	Type III SS	51.11135307	Type I SS	23.37698	0.4.	4201.44775066	4150.33639759	51.11135307	Sum of Squares	
T for HO: Fr Parameter=0	51.11135307	Mean Square	51.11135307	Mean Square	17.21779893	Root MSE		296.45259983	51.11135307	Mean Square	
· › ITI	0,17	F Value	0.17	F Value					0.17	F Value	 !
Std Error of Estimate	0.6843		0,6843	* * * * * * * * * * * * * * * * * * *	(0.000.77+00	RESPONSE Mean			0.6843	**************************************	7
	T for HO: Fr > IT! Parameter=0	51.11135307 51.11135307 0.17 (Type III SS Mean Square F Value 5. 51.11135307 51.1135307 0.17 (T for HO: Pr > III Std Erro Estimate Parameter=0	£ 51.11135307 51.11135307 0.17 DF Type III 88 Mean Square F Value £ 51.11135307 51.11135307 0.17 (51.1135307 Fr > T Std Erro Ferameter=0 Farameter=0	## Type I \$5	0.012165 23.37698 17.21779893 (3.00) DF Type I SS Mean Square F Value 51.11135307 51.11135307 0.17 Type III SS Mean Square F Value 51.11135307 51.11135307 0.17 For HO: Estimate Farameter=0 Fr > III Std Errorester=0	### C.V. Root MSE Respuns C.V. Root MSE Respuns	ted Total 15 4201.44775066 R-Square	14 4150.33639759 296.45259983 cted Total 15 4201.44775066 Root MSE RESPONS R-Square C.V. Root MSE 73.65 0.012165 23.37698 17.21779893 F Value a DF Type I SS Mean Square F Value b Type III SS Mean Square F Value cterro 51.11135307 51.11135307 0.17 cterro 51.11135307 51.11135307 51.11135307 51.11135307	1 51.11135307 - 51.1135307 O.17 14 4150.33639759 294.45259983 15 4201.44775066 R-Square C.V. Root MSE Root MSE C.V. O.012165 23.37698 17.21779893 F Value BF Type I SS Mean Square F Value Type III SS Hean Square F Value St.11135307 51.11135307 O.17 From HO: From HO: From HO: Estimate Farameter=0 Std Erro	### Estimate For HO: F

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

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General Linear Models Frocedure

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INTERCEPT CONTROL	Parameter	TRT	Source	TRT	Source			Corrected Total	Error	Model	Source	Dependent Variable: RESP
μ.		,	DF	**************************************	DF SE	0.129433	R-Square	L	14 A 16 16 16 16 16 16 16 16 16 16 16 16 16	ph	DF	ble: RESP
0.47049045 B 0.43775928 B 0.00000000 B	Estimate	1.62694760	Type III SS	1.62694760	Type I SS	8.428521	, 0, V,	12.56977588	10.94282828	1.62694760	Sum of Squares	
32.54 1.44	T for HO: Farameter=0	1.62694760	Mean Square	1.62694760	Mean Square	0.88409875	Root MSE		0.78163059	1.62694760	Mean Square	
0.0001	Fr > 171	760 2.08	are F Value	760 2.08	are F Value	875	MSE		059	760 2.08	are F Value	•
0.31257611 0.44204937	Std Error of Estimate	0.1711	Pr > 1	0.1711	Pr > F	10.48937029	RESP Mean	. 2		0.1711	P Y Y	, ,

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

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General Linear Models Procedure

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TRT	Source	TRT	Source	· ja		Corrected Total	Error	Model	Source	Dependent Variable: KESF
₩	ğΕ	ş.a.	DF	0.148593	R-Square	2.00	1.4	ъ.	DF	Le: KEST
1.93248732	Type III SS	1.93248732	Type I SS	8.450711	0.V.	13.00527428	11.07278697	1.93248732	Sum of Squares	
1.93248732	Mean Square	1.93248732	Mean Square	0.88933310	Root MSE		0.79091335	1.93248732	Mean Square	
2.44	F Value	2,44	F Value					2.44	F Value	
0.1403) ~ Ti	0.1403	TOY > TI	10.52376693	REGE Mean			0,1403	म् भ	

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

INTERCEPT

100 PPM

10.17623210 B 0.69506966 B 0.000000000 B

Estimate

T for HO: Parameter=0

Pr > 171

Std Error of Estimate

32.36

0.0001

0.31442673

Parameter

analysis of le data

General Linear Models Procedure

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INTERCEPT TRT CONTROL 100 PPm	Parameter	TRT	Source	TRT	Source				Corrected Total	Error	Model	Source	Dependent Variable: RESP
ם י		هدو	P T	Į.s.	Ħ	0.071471	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	R-Oquare	120	14	μ.	ΣF	· S · · · · · · · · · · · · · · · · · ·
11.49837762 B 0.39315489 B 0.00000000 B	Estimate	0.61828306	Type III SS	0.61828306	Type I SS	0.4	A 475884	D.V.	8.64841808	8.03013501	0.61828306	Sum of Squares	
1.04	T for HO: Parameter=0	0.61828306	Mean Square	0.61828306	Mean Square		05.755750	Root MSE		0.57358107	0,41828306	Mean Square	
0,0001	> 171	1.08	F Value	1.08	F Value						1.08	F Value	
0.26776414 0.37867568	Std Error of Estimate	0.3168) F	0.3168	PT > F		11.69495506	RESP Mean			0.3168	चि	1

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

square root transformation

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General Linear Models Frocedure

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INTERCEPT	Parameter	TRT	Source	TRT	Source			Corrected Total	Error	Model	Source	Dependent
CONTROL 100 PPm						0.0	万 !	Total	お客様 () () () () () () () () () (Dependent Variable: RESP
		ja.	DF	j.s .	DF	0.064341	R-square	₽. Ul	14	tr.	H	A SP
11.58897131 B 0.38895554 B 0.00000000 B	Estimate	0.60514564	Type III SS	0.60514564	Type I SS	6.728330	C.V.	9.40524314	8.80009750	0.60514564	Sum of Squares	
41.34 0.98	T for HQ: Parameter=0	0.60514564	Mean Square	0.60514564	Mean Square	0.79282936	Root MSE		0.62857839	0.60514564	Mean Square	
0.0001	Pr > 171	0.96	F Value	0.96	F Value					0.96	F Value	
0.28030751	Std Error of Estimate	(0.3432)) T	0,3432	Pr > =	11.78344908	RESP Mean			0.3432	PT > F	State of the state
												1

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

amalysis of es data

General Linear Models Procedure

INTERCEPT CONTROL TRY 100 ppm	Parameter	TRT	Source	TRT	Source		7° -	Corrected Total	Tron Andrews	Mode Lada and a second	Source	Dependent Variable: RESP
•		,	.4 d	şik.	DF.	0.010862	R-Square	15	± 4	حن	DF.	ZE ST
12.38396473 B 0.15989367 B 0.00000000 B	Estimate	0.10226395	Type III SS	0.10226395	Type I SS	6.543490	C.V.	9.41453580	9.31227185	0.10226395	Sum of Squares	
42.95 0.39	T for HO: Parameter=0	0.10226395	Mean Square	0.10226395	Mean Square	0.81557481	Root MSE		0.66516227	0.10226395	Mean Square	
0.0001	Pr > ITI	0.15	· T		η			14 15 15 15		0.15	F Value	. •
0.28834924 0.40778741	Std Error of Estimate	0.7009		0.7009	Pr > F	12.46391157	RESP Mean			0.7009	च * *	

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

analysis of ec data.

General Linear Models Procedure

								· .						
INTERCEPT CO	Parameter	TRT	Source	TRT	Source	a a ·		Corrected Total	Error	Model	Source	Dependent Va		
CONTROL 100 PPM			DF		DF	0.003687	R-Square	otal 15	44		DF	Dependent Variable: RESP		
1.047791543 0.090684762 0.000000000	П o d	3.	T	, 4	1				4日の一次の変異の		_		e B Mark	
791543 B 584762 B 500000 B	Estimate	0.03289490	Type III SS	0.03289490	Type I SS	79.48610	D.V.	8.92153083		0.03289490	Sum of Squares		General Linea	analysi
-0,23	T for HO: Parameter=0	0	Med	٥	Mex	٥			•	,	Mea		General Linear Models Procedure	analysis of ec data.
0,0023 0,8232	₽q: > +:	0.03289490	Mean Square	0.03289490	Mean Square	0.79680773	Root MSE		0.63490257	0.03289490	Mean Square		, o	
54 D3		0.05	F Value	0.05	F Value			Section 2		0,00	r Value	<u></u>	*	•
0.281(1408	Std Error of Estimate	0.000				0	KESP Flean	property by a car		O. Brok	- A-A-A-A-A-A-A-A-A-A-A-A-A-A-A-A-A-A-A			
7 87 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8			,									Wind.		2

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

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analysis of el data

General Linear Models Procedure

Par INT TRT	ТВТ	Sa	TRT	So		·	Cor	**************************************	Mod	Sou	Lep
Parameter INTERCEPT CONTROL TRT 100 PPM	Τ.	Source	T .	Source			Corrected Total	Ertor	Model	Source	Dependent Variable, Kee
	ĻĀ	Þ,	خبز	DF	0.009251	R-Square	1 UI	14	حر	PF	· ·
Estimate 12.91330728 B 0.15334293 B 0.00000000 B	0.09405621	Type III SS	0.09405621	Type I 88	6.529965	C.V.	10.16723814	10.07318193	0.09405621	Sum of Squares	
Parameter=0 43.06 0.36	0.09405621	Mean Square	0.09405621	Mean Square	0.84824112	Root MSE		0.71951299	0.09405621	Mean Square	
0.0001	· · · · · · · · · · · · · · · · · · ·	E Value	0.13	Π					0.13	- Value	1
Estimate 0.29989852 0.42412056	Std Error of	0.723	E CNOP		12,87,721	REST Dean			O. (No.	> 107.	D 1 - 7

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

square root transformation

COMPOUND: RH-2915 TECHNICAL, BORWHITE BUAIL

Malla & Duck

ANALYSIS OF FOOD CONSUMPTION DATA REPEATED MEASURES

GENERAL LINEAR MODELS PROCEDURE
REPEATED MEASURES ANALYSIS OF VARIANCE
TESTS OF HYPOTHESES FOR BETWEEN SUBJECTS EFFECTS

TYPE III SS

19.57502976 66.22541667

TRT ERROR

SOURCE

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MEAN SQUARE

19.57502976 4.73038690

F VALUE

4.14 0.0613 77. ~ F 7. 4.

16:20 MONDAY, APRIL 1, 1991 25

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analysis of food consumption data

General Linear Models Procedure

3.52381407 4.98342565	0.0001	19.36 2.03 0	68.22500000 B 10.13750000 B 0.000000000 B	CONTROL 100 PPM	INTERCEPT CONT
Std Error of Estimate	Pr > ITI	T for HO: Pr Farameter=0	Estimate		Parameter
(0:0613	4.14	411.07562500	411.07562500	;» .	TRT
Pr > F	F Value	Mean Square	Type III SS	DF	Source
0.0613	4.14	411.07562500	411.07562500	9.8 .	TRT
Pr > F	T Value	Mean Square	Type I SS	DH	Source
73.29375000		9.96685131	13,59850	0.228146	
RESP Mean		Root WSE	C.V.	R-Square	
			1801.80937500	15	Corrected Total
		97.33812500	1390.73375000		Error
0.0613	4.14	411.07562500	411.07562500	1	Mode L
F > F-	F Value	Mean Square	Sum of Squares	ŊF	Source
				·iable: RESP	Dependent Variable: RESP

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

analysis of food consumption data

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-- WEEK-12 --

General Linear Models Procedure

12

INTERCEPT TRT	Parameter	TRT	Source	TRT	Source			Corre	Error	Mode I	Source	Depen
CEPT CONTROL 100 PPm	eter		n		n ,			Corrected Total		÷ år:	æ	Dependent Variable: RESP
		, ph	ħ	Ą	ÜF	0.464035	R-Square	ŭ	14		Ħ.	RESP
3.425000000 B 1.150000000 B 0.000000000 B	Estimate	5,2900000	Type III 88	5.29000000	Type I SS	16.51569	C.V.	11.40000000	6.11000000	5.2900000	Sum of Squares	
14.66	T for HO: Parameter=O	5.29000000	Mean Square	5.29000000	Mean Square	0.66062741	Root MSE		0.43642857	5,29000000	Mean Square	
0.0001	Pr > 1T1	12.12	re F Value	12.12	re F Value	⁷ 41	1SE		357	12.12	e F Value	
0.23356706	Std Error of Estimate	0.0037	£,4. > £.	0.0037	₽Y > FI	4.00000000	RESP Mean			0.0037	Pr > F	

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

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analysis of food consumption data

General Linear Models Procedure

WEEK=20

0.14741069 0.20847019	001	0.0001	24.25 3.30	3.575000000 B 0.687500000 B	• •	DEPT CONTROL	INTERCEPT
Std Error of Estimate	171	TO	T for HO: Parameter=0	Estimate		eter	Parameter
0,0053	10.88	1.89062500		1.89062500	ţA		TRT
Pr > F	F Value	Mean Square		Type III SS	₽ T	ענ	Source
0.0053	10.88	1,89062500		i.89062500	12 .		TRT
Pr > F	F Value	Mean Square		Type I SS	DT	49	Source
3.91875000		0.41694039		10.63963	0.437202		
RESP Mean		Root MSE		0.V.	R-Square		
				4.32437500	, ca Cu	Corrected Total	Correc
		0.17383929		2.43375000	14		Error
0,0053	10.68	1.89062500		1.89062500	. .		Model
F-7 - 7	F Value	Mean Square		Sum of Squares	7)-		Source

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

kbn - epa study compound: RH-2915 Technical, mallard duck

analysis of 14-day survivor weight data

General Linear Models Frocedure

Dependent Variable: RESP

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•••	48 49 50	CAGE(TRT): 45 46 47	10	∞ √6	-4. ID	u N i		ERCEPT	Parameter -	TAT WEEK CAGE(TAT) TAT*WEEK	Source	TRT WEEK CAGE(TRT) TRT*WEEK	Source			Corrected 1	Error	Mode !	Source
		5 CONTROL 6 CONTROL 7 CONTROL	•	•			100 ppm	CONTROL						٥	ᅏ	Total			
	,				•					40 40	DF	4 0 4 0 0	ρĦ	0,829852	Risquare	159	126	54 2.	ğ
	18.6	-8.4 -7.7	23.5	24.5	-16.2 27.9	62	0 0	209.	Щ							*			
,	18.6400000 B 12.1200000 B 4.9800000 B	2818300000 B -8.4900000 B -7.7300000 B	23.9750000 B	1.1250000 B 24.2625000 B 19.3125000 B	16.2875000 B	-62.7500000 B	0.0000000 B	209.3950000 B	Estimate	300.85225000 110578.81350000 33492.04550000 11158.91400000	Type	300.85225000 110578.81350000 33492.04550000 11158.91400000	7	_		187419.	31889.:	155530.	Sum of
							· ·			300.85225000 10578.81350000 33492.04550000 11158.91400000	Type III SS	300.85225000 10578.81350000 33492.04550000 11158.91400000	Type I SS	6.758859	c.v.	187419.74975001	31889.12450001	155530.62525000	Sum of Squares
	~~·	Jo L.J. Á		· ·	, ,	i Latin		N	T for HO: Parameter=0										
	0.70	4.05	2.6	: }:	8.00 0.00	7.89) ; ; ;	28.55	HO:	300.85225000 12284.53483333 2392.28896429 1239.87933333	Mean	300.8 12286.5 2392.2 1239.8	Mean	15.9	20		253.0	4713.0	Mean
			, gad						70	300.85225000 2286.53483333 2392.28896429 1239.87933333	Mean Square	300.85225000 12286.5348333 2392.28896429 1239.87933333	Mean Square	15.90874884	Root MSE		253.08828968	4713.04925000	Mean Square
	0.0099	0.0001	0.0031	0.8878	0.0427	0.0001		0.0001	Pr > 171										
		r.								1.19 48.55 9.45 4.90	F Value	1.19 48.55 9.45 4.90	F Value					18.62	F Value
	7.11.7.	7.11	7.95	1.7.7. 1.7.7.7.	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	7.95	10.01	7.33	Std Er					235	***				
次 日本 東京大学	7.11460877 7.11460877 7.11460877	7.11460877 7.11460877	7.95437442	7.95437442	7.95437442 7.95437442 7.95437442	7.95437442		7.33357086	Std Error of Estimate	0.2777 0.0001 0.0001	Pr > F	0.0001	PT > F	235.37625000	RESP Mean			1000.0	77 > 7
T.	egan e			\$ / \$				•							4.1				-

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06:58 Monday, April 1, 1991 2

kbn - epa study compound: RM-2915 Technical, mallard duck

analysis of 14-day survivor weight data

---- WEEK=1

General Linear Models Procedure

Dependent Variable: RESP

INTERCEPT TR' H Mode L Parameter Source Source Corrected Total Error Source 100 PPm 0.564923 R-Square 무 1.5 14 219.7000000 B 30.7000000 B 0.0000000 B Estimate Sum of Squares 3769.96000000 3769.96000000 6673.40000000 2903.44000000 3749.96000000 Type III SS Type I SS 6.126778 C.V. T for HO: Parameter=0 43.15 3769.96000000 3769.96000000 3769.96000000 207.38857143 Mean Square Mean Square 14.40099203 Mean Square Root MSE Pr > |T| 0.0001 F Value F Value Value 18.18 18.18 18.18 Std Error of Estimate 5.09151956 235.05000000 0.0008 RESP Mean ₽ • • 0.0008 Pr > F 0.0008 Pr > F

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

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06:58 Monday, April 1, 1991

analysis of 14-day survivor weight data

--- WEEK=4 ---

General Linear Models Procedure

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arameter	ŔŢ	ource	ХT	ource		orrected	rror	lapo	ource	ependent
					Q 77	Total		ار محمد ا		Dependent Variable: RESP
	ņ.	ÞF	þ.	DF .	-8quare	U.	14.		₽F	XIII O T
Estimate	2711.80562500	Type III SS	2711.80562500	Type I SS	C.V. 9,294114	7992.05937500	5280.25375000	2711.80562500	Sum of Squares	
T for HO: Parameter=0	2711.80562500	Mean Square	2711.80562500	Mean Square	19.		377.16098214	2711.80562500	Mean Square	
Pr > 171	7.19	F Value	7.19	T Value				7.19	F Value	
Std Error of Estimate	0.0179	ण 	0.0179	рг > т	RESP Mean 208.95425000		1	0.0179	्र न २	
	T for HO: Fr > T St	1 2711.80562500 2711.80562500 7.19 T for HO:	DF Type III SS Mean Square F Value 1 2711.80562500 7.19 1 2711.80562500 7.19 1 Std Error Estimate Parameter=0 Estimate	1 2711.80562500 2711.80562500 7.19 DF Type III SS Mean Square F Value 1 2711.80562500 2711.80562500 7.19 T for HO: Perameter=0 Fr > IT! Std Erro	DF Type I SS Mean Square F Value 1 2711.80562500 2711.80562500 7.19 pr Type III SS Mean Square F Value 1 2711.80562500 2711.80562500 7.19 ter Estimate Parameter=0 Fr > III Std Error	R-Square C.V. Root MSE 0.339312 4.294114 19.42043290 208 DF Type I SS Mean Square F Value 1 2711.80562500 2711.80562500 7.19 1 2711.80562500 2711.80562500 Fr > ITI Std E ter Estimate Parameter=0 Fr > ITI Std E	ted Total 15 7992.05937500 Root MSE RES R-Square C.V. Root MSE RES DF Type I SS Mean Square F Value 1 2711.80562500 2711.80562500 7.19 pF Type III SS Mean Square F Value pF Type III SS Mean Square F Value T for HO: Pr > ITI Std Errc Estimal Estimal Estimal	ted Total 14 5280:25375000 377.16098214 R-Square C.V. Root MSE DF Type I SS Mean Square F Value 1 2711.80562500 2711.80562500 7.19 pF Type III SS Mean Square F Value pF Type III SS Mean Square F Value pF Type III SS Mean Square F Value pF Tor HO: Fr > III Std E Frammeter=0 Fr > III Std E	2711.80562500 2711.80562500 7.19 14 2711.80562500 377.16078214 15 7972.05937500 R-Square C.V. Root MSE O.339312 9.294114 19.42063290 F Value Port MSE O.339312 2711.80562500 2711.80562500 7.19 a pr Type I SS Mean Square F Value Port MSE O.339312 171 Std E Estimate Farameter=0 Fr > T Std E Estimate Farameter=0 Fr > T Std E Estimate Farameter=0 Fr > T Std E Estimate Farameter=0 Fr > T	Ee DF Sum of Squares Mean Square F Value 1 2711.80562500 2711.80562500 7.19 14 5280.25375000 377.16098214 7.19 R-Square C.V. Root MSE 205 0.339312 Type I SS Mean Square F Value a DF Type I SS Mean Square F Value b DF Type III SS Mean Square F Value c DF Type III SS Mean Square F Value c DF Type III SS Mean Square F Value c DF Type III SS Mean Square F Value c DF Type III SS Mean Square F Value c DF Type III SS Mean Square F Value c T for HO: 7.19 7.19

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. followed by the letter 'B' are biased, and are not unique estimators of the parameters. Estimates

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06:58 Monday, April 1, 1991 20

kbn + spa study compound: RH-2915 Technical, mailard duck

analysis of 14-day survivor weight data

ELIK U

General Linear Models Frocedure

Dependent Variable: RESP

Source DF Sum of Squares Mean Square F Value Pr > F. Model 1 2366.82250000 2366.82250000 4.94 4.94 0.0432 Error 14 6703.78750000 478.84196429 4.94 0.0432 Corrected Total 15 9070.61000000 Respective Respective Respective R-Square C.V. Root MSE Respective 254.0250000 Source DF Type I SS Mean Square F Value Pr > F TRT 1 2366.82250000 2366.82250000 4.94 0.0432 Source DF Type I II SS Mean Square F Value Pr > F TRT 4 2366.82250000 4.94 0.0432 Std Error of Estimate Parameter=0 Fr > ITI Std Error of Estimate	96 96	7.73661719	0.0001	000	-2.22	266.1875000 B -24.3250000 B 0.0000000 B	∌ Γ	INTERCEPT TRT CONTROL 100 PPM
TCE DF Sum of Squares Mean Square F Value Pr > F 1	0+	Std Error o	171		T for HO: Parameter=0	Estimate		Parameter
### Sum of Squares Mean Square F Value Pr > F Value 1 2366.82250000 2366.82250000 4.94 0.0433 #### 14 6703.78750000 478.84196429 ###################################	0432	0.0	4.94	82250000	2366.	2366,82250000	. حو	TRT
DF Sum of Squares Mean Square F Value Pr > F 1 2366.82250000 2366.82250000 4.94 0.043 14 6703.78750000 478.84196429 4.94 0.043 R-Square C.V. Root MSE Resp Mean 0.260933 8.614293 21.88245791 254.0250000 DF Type I SS Mean Square F Value Pr > I 1 2366.82250000 2366.82250000 4.94 0.043	~	P	F Value	m Square	Mea	Type III SS	DF	Source
DF Sum of Squares Mean Square F Value Pr > F 1 2366.82250000 2366.82250000 4.94 0.043 14 6703.78750000 478.84196429 4.94 0.043 ted Total 15 9070.61000000 Root MSE Resp Mean R-Square C.V. Root MSE RESP Mean 0.260933 8.614293 21.88245791 E Value Pr > I	0432	0.0	4.94	82250000	2366.	2366.82250000	44	TRT
DF Sum of Squares Mean Square F Value Pr > F 1 2366.82250000 2366.82250000 4.94 0.043 14 6703.78750000 478.84196429 15 9070.61000000 Root MSE RESP Mean 0.260933 8.614293 21.88245791 254.0250000	7	Pr	F Value	m Square	Mea	Type I SS	DF	Source
DF Sum of Squares Mean Square F Value Pr > F 1 2366.82250000 2366.82250000 4.94 0.043 14 6703.78750000 478.84196429 15 9070.61000000 Root MSE RESP Mean	0000	254.02500		.88245791	21.	8.614293	0.260933	
DF Sum of Squares Mean Square F Value Pr > F 1 2366.82250000 2366.82250000 4.94 0.0432 14 6703.78750000 478.84196429 15 9070.610000000	Mean	RESP		Root MSE		C.V.	R-Square	
E DF Sum of Squares Mean Square F Value 1 2366.82250000 2366.82250000 4.94 14 6703.78750000 478.84196429						9070.61000000	es. Ui	Corrected Total
e DF Sum of Squares Mean Square F Value 1 2366.82250000 2366.82250000 4.94				84196429	478.	6703.78750000	14	Error
DF Sum of Squares Mean Square F Value	0432	0.0	4.94	82250000	2366.	2366.82250000	هو	Model.
	∨ ¶	Pr	F Value	m Square	Mea	Sum of Squares	DF	Source

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

三 一概要要并付其事事事要者 三十八

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General Linear Models Frocedure

Tests of Hypotheses using the Type III MS for CAGE(TRT) as an error term

Dependent Variable: THICK

Source 벍

Type III SS 0.00008879

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今、如此官於軍務衛軍等等為各員的事養養司事可以下了、大臣万人以上

Mean Square

0.00008879

F Value

0.08

0.7828

compound: RH-2915 Technical, mallard duck

16:28

MONDAY, APRIL

COMPANDED THE SHARLES FOR CONTRACT AND ALL TOWN EXECUTIVE

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ATRANSFORMED, WITH WEIGHTS

GENERAL LINEAR MODELS PROCEDURE

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VIV MATERY HAS BEE	INTERCEPT CONTROL 100 PPM	PARAMETER	TRT	SOURCE	TRT	SOURCE		ر ایمان اصور ارم اصور اصور ارم اصور ارم اص اصور اصور اصور اصور ارم اصور اصور اصور اصور اصور اصور اصور اصور	CORRECTED TOTAL	ERROR	MODEL	SOURCE	DEPENDENT VARIABLE: RESPONSE WIGHT:
	•		<u>ş</u> a.	PF PF	μ.	74	0.011700	R-SQUARE	1.U	14		DF	: RESPONSE
which which the transfer of th	4.831746114 B -0.696394958 B 0.000000000 B	ESTIMATE	328.51861035	TYPE III SS	328.51861035	TYPE I SS	0206.266	0.4,	28078.45825240	27749.93964205	328.51861035	SUM OF SQUARES	
NOTE: THE VIV KATOTY LAG BEEN COMEN TO THE DEVICE AT A CONTROL THE VICTOR OF THE VICTO	-0,41 -0,41	T FOR HO: PARAMETER=0	328.51861035	MEAN SOLIARE	328.51861035	MEAN SQUARE	44.52121456	ROOT MSE		1982.13854586	328.51861035	MEAN SQUARE	
	0.6901	FR > ITI	0,17	F VALUE	0.17	F VALUE					0.17	F VALUE	•
	1.21668097 1.71057702	STD ERROR OF ESTIMATE	0.6901	P20 ~ 年	0.6901	PR > F	4.47943708	RESPONSE MEAN			0.6901	PR > F	

NOTE: THE X'X MATRIX HAS BEEN FOUND TO BE SINGULAR AND A GENERALIZED INVERSE WAS USED TO SOLVE THE NORMAL EQUATIONS. ESTIMATES FOLLOWED BY THE LETTER 'B' ARE BLASED, AND ARE NOT UNIQUE ESTIMATORS OF THE PARAMETERS.

COMPOUND: RH-2015 TECHNICOL, BUHWHITE-GHAIL

16:12 MUNDAY, APRIL 1, 1991